

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently Amended) A method for discriminating between textual content and graphical content in an image comprising:

receiving a plurality of pixel values for a pixel line segment;

calculating a plurality of spatial gradients based on pixel values of adjacent pixels along the pixel line segment;

determining a smoothness index based on one or more non-linear statistical characteristics in response to the plurality of spatial gradients; and

identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a threshold value.

2. (Original) The method of claim 1 wherein the step of calculating a plurality of spatial gradients comprises the step of subtracting an adjacent pixel value from a current pixel value for each of the plurality of pixel values.

3. (Previously Presented) The method of claim 1 wherein the step of determining a smoothness index comprises:

calculating a first statistical characteristic of the plurality of spatial gradients;

calculating a second statistical characteristic of the plurality of spatial gradients;

dividing the second statistical characteristic by the first statistical characteristic to generate the smoothness index.

4. (Currently Amended) ~~The method of claim 3 wherein calculating a first statistical characteristic comprises~~ A method for discriminating between textual content and graphical content in an image comprising:

receiving a plurality of pixel values for a pixel line segment;

calculating a plurality of spatial gradients based on pixel values of adjacent pixels;

calculating a first statistical characteristic of the plurality of spatial gradients by squaring each of the spatial gradients to generate a plurality of squared gradients; and ~~generating the first statistical characteristic by summing the squared gradients;~~

calculating a second statistical characteristic of the plurality of spatial gradients;
dividing the second statistical characteristic by the first statistical characteristic to generate a smoothness index; and
identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a threshold value.

5. (Currently Amended) ~~The method of claim 3 wherein calculating a second statistical characteristic comprises~~A method for discriminating between textual content and graphical content in an image comprising:

~~generating a plurality of absolute~~receiving a plurality of pixel values for a pixel line segment;
calculating a plurality of spatial gradients based on pixel values of adjacent pixels;
calculating a first statistical characteristic of the plurality of spatial gradients;
calculating a second statistical characteristic of the plurality of spatial gradients by determining an absolute value of each of the spatial gradients; determining a sum value by,
summing the absolute gradients; and generating the second statistical characteristic by squaring the sum value. squaring the sum value;
dividing the second statistical characteristic by the first statistical characteristic to generate a smoothness index; and
identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a threshold value.

6. (Currently Amended) A method for discriminating between textual content and graphical content in an image comprising:

receiving a first plurality of pixel values for a pixel line segment and a second plurality of pixel values for the pixel line segment;

calculating a plurality of spatial gradients for the pixel line segment based on the first plurality of pixel values of adjacent pixels within the pixel line segment;

determining a smoothness index based on one or more non-linear statistical characteristics in response to the plurality of spatial gradients;

calculating a value by combining the second plurality of pixel values; and

identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a first threshold value and the calculated value of the second plurality of the pixel values to a second threshold value.

7. (Original) The method of claim 6 wherein the step of calculating a plurality of spatial gradients comprises the step of subtracting an adjacent pixel value from a current pixel value for each of the first plurality of pixel values.

8. (Previously Presented) The method of claim 6 wherein the step of determining a smoothness index comprises:

calculating a first statistical characteristic of the plurality of spatial gradients;

calculating a second statistical characteristic of the plurality of spatial gradients;

dividing the second statistical characteristic by the first statistical characteristic to generate the smoothness index.

9. (Currently Amended) ~~The method of claim 8 wherein calculating a first statistical characteristic comprises~~ A method for discriminating between textual content and graphical content in an image comprising:

receiving a first plurality of pixel values for a pixel line segment and a second plurality of pixel values for the pixel line segment;

calculating a plurality of spatial gradients for the pixel line segment based on the first plurality of pixel values of adjacent pixels;

determining a smoothness index in response to the plurality of spatial gradients by calculating a first statistical characteristic of the plurality of spatial gradients by squaring each of the spatial gradients to generate a plurality of squared gradients; and summing the squared gradient, calculating a second statistical characteristic of the plurality of spatial gradients, and dividing the second statistical characteristic by the first statistical characteristic to generate the smoothness index;

calculating a value by combining the second plurality of pixel values; and

~~generating the first statistical characteristic by summing the squared gradients.~~

identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a first threshold value and the calculated value of the second plurality of the pixel values to a second threshold value.

10. (Currently Amended) ~~The method of claim 9 wherein calculating a second statistical characteristic comprises~~A method for discriminating between textual content and graphical content in an image comprising:

~~generating~~receiving a first plurality of absolute pixel values for a pixel line segment and a second plurality of pixel values for the pixel line segment;

calculating a plurality of spatial gradients for the pixel line segment based on the first plurality of pixel values of adjacent pixels;

determining a smoothness index in response to the plurality of spatial gradients by calculating a first statistical characteristic of the plurality of spatial gradients and calculating a second statistical characteristic of the plurality of spatial gradients by determining an absolute value of each of the spatial gradients; ~~determining a sum value by,~~ summing the absolute gradients; and squaring the sum value, and dividing the second statistical characteristic by the first statistical characteristic;

calculating a value by combining the second plurality of pixel values; and

~~generating the second statistical characteristic by squaring the sum value.~~

identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a first threshold value and the calculated value of the second plurality of the pixel values to a second threshold value.

11. (Original) The method of claim 6 wherein the step of calculating a value by combining the second plurality of pixel values further comprises the step of calculating the maximum of the second plurality of pixel values.

12. (Original) The method of claim 6 further comprising the steps of:

receiving a third plurality of pixel values for the pixel line segment; and

calculating a value by combining the third plurality of pixel values, and wherein the step of identifying the pixel line segment as one of a text segment or a graphic segment further comprises comparing the calculated value of the third plurality of pixel values to a third threshold value.

13. (Original) The method of claim 12 wherein the step of calculating a value by combining the third plurality of pixel values comprises the step of calculating the maximum of the third plurality of pixel values.

14. (Currently Amended) An apparatus for discriminating between textual content and graphical content in an image comprising:

a converter for receiving a plurality of pixel values for a pixel line segment;

a separator module for calculating a plurality of spatial gradients based on pixel values of adjacent pixels within the pixel line segment, a smoothness index based on one or more non-linear statistical characteristics in response to the plurality of spatial gradients, and identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a threshold value.

15. (Previously Presented) The apparatus of claim 14 wherein the separator module calculates the spatial gradients by subtracting an adjacent pixel value from a current pixel value for each of the plurality of pixel values.

16. (Previously Presented) The apparatus of claim 14 wherein the separator module calculates the smoothness index by:

calculating a first statistical characteristic of the plurality of spatial gradients;

calculating a second statistical characteristic of the plurality of spatial gradients;

dividing the second statistical characteristic by the first statistical characteristic to generate the smoothness index.

17. (Currently Amended) ~~The apparatus of claim 16 wherein calculating a first statistical characteristic comprises~~An apparatus for discriminating between textual content and graphical content in an image comprising:

~~squaring each of the spatial gradients to generate a plurality of squared gradients; and~~

~~a converter for receiving a plurality of pixel values for a pixel line segment;~~

~~generating the separator module for:~~

~~_____ calculating a plurality of spatial gradients based on pixel values of adjacent pixels;~~

~~_____ calculating a smoothness index based on one or more statistical characteristics in response to the plurality of spatial gradients by calculating a first statistical characteristic by of the plurality of spatial gradients by squaring each of the spatial gradients and summing the squared gradients, calculating a second statistical characteristic of the plurality of spatial gradients, and dividing the second statistical characteristic by the first statistical characteristic; and~~

~~_____ identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a threshold value.~~

18. (Currently Amended) ~~The apparatus of claim 16 wherein calculating a second statistical characteristic comprises~~An apparatus for discriminating between textual content and graphical content in an image comprising:

~~generating a plurality of absolute~~a converter for receiving a plurality of pixel values for a pixel line segment;

a separator module for:

calculating a plurality of spatial gradients based on pixel values of adjacent pixels;

calculating a smoothness index based on one or more statistical characteristics in response to the plurality of spatial gradients by calculating a first statistical characteristic of the plurality of spatial gradients, calculating a second statistical characteristic of the plurality of spatial gradients by determining an absolute value of each of the spatial gradients; ~~determining a sum value by, summing the absolute gradients; and~~ generating the second statistical characteristic by squaring the sum value, squaring the sum value, and dividing the second statistical characteristic by the first statistical characteristic; and

identifying the pixel line segment as one of a text segment or a graphic segment by comparing the smoothness index to a threshold value.